An Open Internet

Nondiscrimination and Transparency

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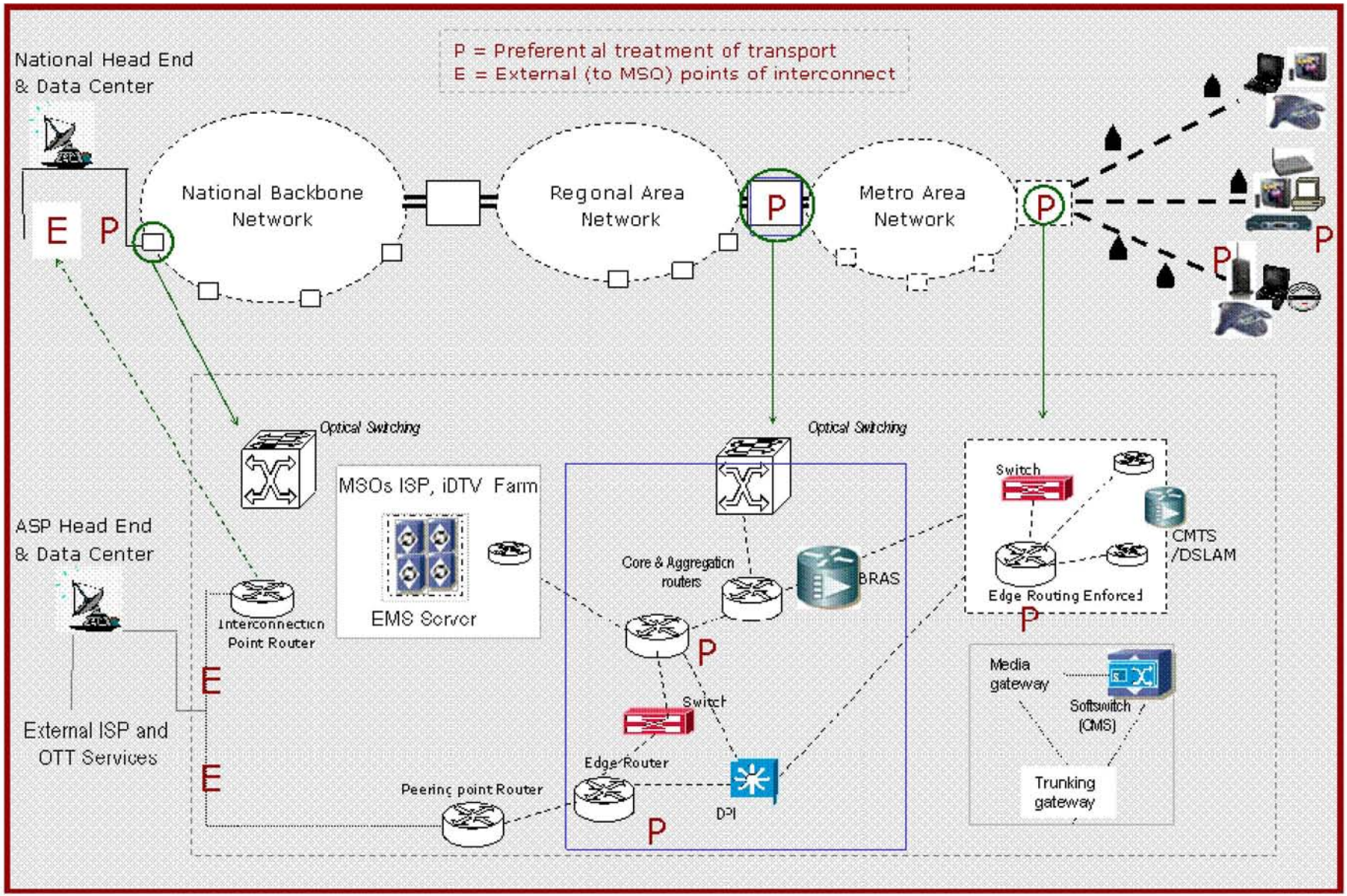
U.K. Model

- ✓ Regulatory body (OFCOM) has the authority to monitor network activity on a daily basis and impose significant penalties for non-compliance.
- ✓ Nevertheless, the UK remains a world leader in digital communications with some of the lowest broadband and telephony prices.
- ✓ Britons have the highest proportion of households with digital TV - 88 percent.
- ✓ Open network regulations created platform competition, which drove investment by British Telecom.
- ✓ Consumers can get basic broadband for free in the UK.

MSO End-to-end transport architecture



Network Congestion

- ✓ 10% of Internet users make up over 60% of traffic.
- ✓ Industry trends show that interactive applications are increasing at a much higher rate than latency-tolerant applications.
- ✓ DPI is not important for managing congestion.
- ✓ Standards-based approaches can detect congestion and automatically reduce traffic throughput when congestion is evident:
    - ✓ LEDBAT
    - ✓ TCP/IP ECN13 (Explicit Congestion Notification)
    - ✓ IETF's PCN14 (Pre-Congestion Notification)
- ✓ If prioritization is permitted, then the hierarchy of traffic must be decided by either the network operator or an outside party (e.g., a standards setting body).
- ✓ Monitoring agents could be placed at the national headend and at the edge of the network to track latency and jitter. The data could be subject to audit.

Proposed Rule #5

- ✓ We agree that net neutrality rules should apply to: "Internet access service providers that are providing broadband internet services." But, this begs the question of what portion of the network operators' "pipe" should fall within the rules.

- ✓ Except for certain exemptions, all content distributed on the "pipe" should be subject to the non-discrimination rules. This includes, for example, video-on-demand services, interactive applications, and VOIP.

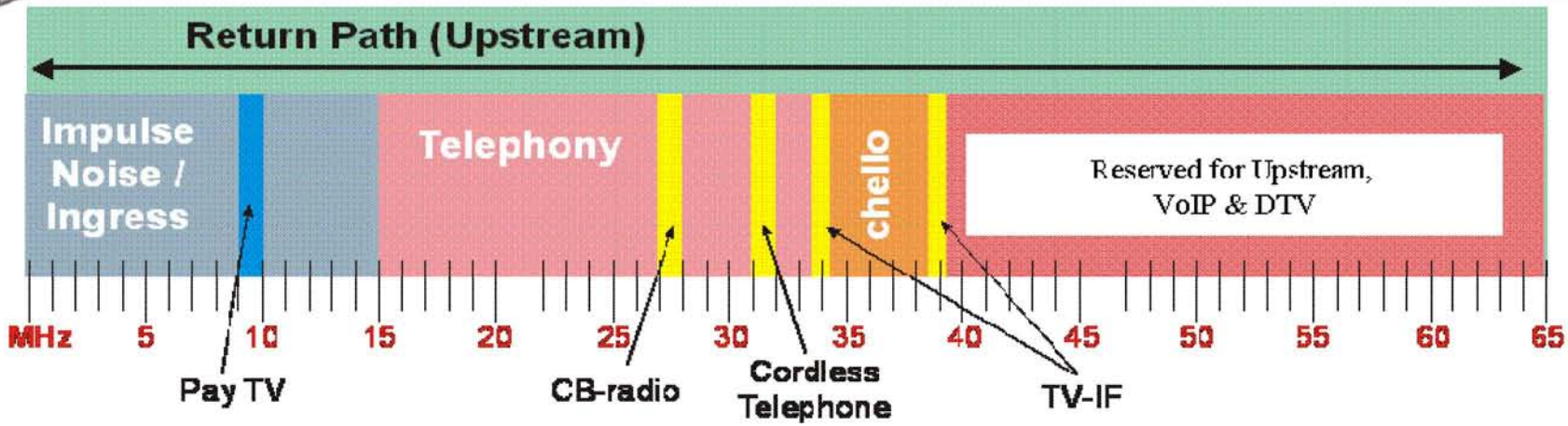
- ✓ There should be limited exemptions for:

  (a) "a portion of the electromagnetic frequency spectrum that is used by a multi-channel video programming distributor ("MVPD") to deliver the one-way transmission of linear television channels to residential subscribers"; and

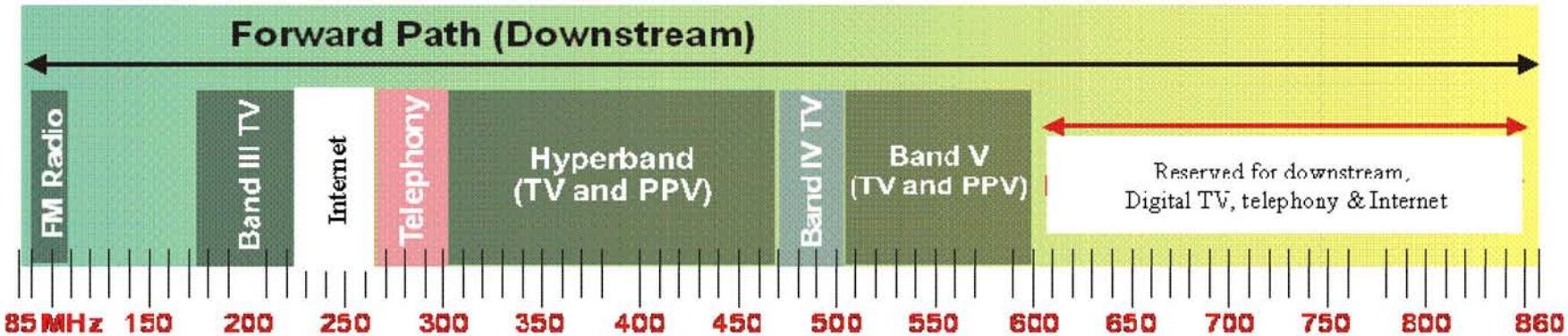
  (b) law enforcement, public safety, and national security authorities.

- ✓ Exempting all Title VI services is too broad, because it presents the danger of network operators categorizing certain content as falling outside the NN rules.

MSO Spectrum Usage



65MHz - 85MHz - Not Available



Transparency – Proposed Rule #6

- ✓ Network Operators must publish their specific network management protocols/practices (e.g. algorithms used to prioritize traffic, degradation policies, etc.).
- ✓ Tools must be made available to end users:

  (a) To monitor bandwidth usage and speed of delivery;

  (b) To monitor points of network congestion in real time;

  (c) To determine whether certain applications are being degraded over substantially similar applications; and

  (d) To detect packet injection/spoofing by network operator (e.g., Switzerland and Pcapdiff tools).
- ✓ Network operators cannot block or subvert use of such transparency tools.
- ✓ Network operators must submit to random audits by FCC field engineers.
- ✓ Service Level and "Peering" Agreements between network operators must be publicly disclosed.
- ✓ If DPI is permitted, any use of DPI must be publicly disclosed and network operators need to follow standardized DPI protocols.

Audit tools for measuring/detecting ISP interference

Known ISP Testing Software

Source: http://www.eff.org/testyourisp#projects

Tool	Active / Passive	# Participants per Test	Platform	Protocols	Notes
Gemini	Active (?)	Bilateral	Bootable CD	?	Uses pcapdiff
Glasnost	Active	1.5 sided	Java applet	BitTorrent	
ICSI Netalyzr	Active	1.5 sided	Java applet + some javascript	Firewall characteristics, HTTP proxies, DNS environment	
ICSI IDS	Passive	0 sided (on the network)	IDS	Forged RSTs	Not code users can run
Google/New America MeasurementLab	Active	2 sided	PlanetLab (server), Any (client)	Any	A server platform for others' active testing software
NDT	Active	1.5 sided	Java applet / native app	TCP performance	A sophisticated speed test
Network Neutrality Check	Active	1.5 sided	Java applet	No real tests yet	Real tests forthcoming here ; discussion here
NNMA	Passive	Unilateral	(currently) Windows app	Any	
pcapdiff / tpcat	Either	Bilateral	Python app	Any	A tool to make manual tests easier. EFF is no longer working on pcapdiff, but development continues with the tpcat project.
Switzerland	Passive	Multilateral	Portable Python app	Any	Sneak preview release just spots forged/modified packets
Web Tripwires	Passive	1.5 sided	Javascript embed	HTTP	Must be deployed by webmasters